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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte VINCENT JEANNE and
HENDRIKUS PETRUS MARIA STERKEN

Appeal 2017-011749
Application 15/029,271
Technology Center 3700

Before TAWEN CHANG, JOHN E. SCHNEIDER, and
TIMOTHY G. MAJORS, *Administrative Patent Judges*.

MAJORS, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants¹ submit this appeal under 35 U.S.C. § 134(a) involving claims to a device configured to obtain a vital sign of a subject, and to a related non-transitory computer readable medium. The Examiner rejected the claims as failing the written description requirement, as indefinite, as claiming ineligible subject matter, and as obvious. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM-IN-PART.

¹ Appellants identify the Real Party in Interest as Koninklijke Philips N.V. App. Br. 1.

STATEMENT OF THE CASE

Appellants’ “invention relates to an unobtrusive optical measurement approach which can be used for detecting vital signs in an observed subject, such as a person or animal.” Spec. 1:2–5. According to the Specification, “[i]t is an object of the present invention to provide a device and a method for reliably and accurately obtaining a vital sign of a subject under varying lighting conditions ranging, potentially from full sun light to bedroom light levels at night.” *Id.* at 3:28–30.

The Specification explains that “[p]hotoplethysmography (PPG) is an optical measurement technique that evaluates a time-variant change of light reflectance or transmission of an area of interest.” *Id.* at 1:16–18. PPG allows for measuring various vital signs of a subject, such as heart rate, respiration rate, and blood oxygen saturation, based on information derivable from a PPG waveform (also referred to as a PPG signal). *Id.* at 1:13–25.

The Specification discloses:

PPG is based on the principle that blood absorbs more light than surrounding tissue, so variations in blood volume with every heart beat affect transmission and reflectance correspondingly. . . . By evaluating the transmissivity and/or reflectivity at different wavelengths (typically red and infrared), the blood oxygen saturation can be determined.

Id. at 1:18–24. According to the Specification, measurements are often taken with conventional pulse oximeters attached to a subject’s skin. *Id.* at 1:24–25. The Specification states, however, that “non-contact” or “remote” PPG devices have been introduced, and that such devices “are considered unobtrusive and well suited for medical as well as non-medical everyday applications.” *Id.* at 1:26–2:2.

Claims 1, 2, 4–9, 11–14, and 16–23 are on appeal. Claim 1 is illustrative:

1. A device configured to obtain a vital sign of a subject, comprising
 - an interface configured to receive a set of image frames of a subject, an image frame including a plurality of image pixels having associated pixel values;
 - at least one processor programmed to:
 - extract a photoplethysmographic, PPG, signal of the subject from said set of image frames;
 - determine a feature of said PPG signal indicative of the quality of the information content of the extracted PPG signal with respect to a desired vital sign of the subject;
 - determine a binning configuration based on the determined feature of the extracted PPG signal and based on a lookup table including a number of binning configurations for different values of the determined feature of the extracted PPG signal or a continuous or discrete function thereof, said binning configuration being provided for controlling binning of image pixels of an image frame[;]
 - bin image pixels of an image frame based on the determined binning configuration to obtain a binned image frame, wherein the PPG signal is extracted from said binned image frames; and
 - determine vital sign information from the extracted PPG signal.

App. Br. 31 (Claims App.).²

² After the Examiner’s Final Rejection dated Nov. 22, 2016 (“Final Act.”), Appellants submitted Remarks on Jan. 20, 2017, including proposed claim amendments. The Examiner entered the after-final amendment. Advisory Action 1–2 (dated Feb. 9, 2017) (“Adv. Act.”).

The claims stand rejected as follows:

- I. Claim 13 under 35 U.S.C. § 112(a) for failing to satisfy the written description requirement.
- II. Claims 7, 11, 13, 18, and 23 under 35 U.S.C. § 112(b) for indefiniteness.
- III. Claims 1, 2, 4–9, 11–14, and 16–23 under 35 U.S.C. § 101 as claiming a patent-ineligible abstract idea.
- IV. Claims 1, 2, 4, 5, 7–9, 11–14, and 16–23 under 35 U.S.C. § 103 as obvious over Kirenko³ and Lim.⁴
- V. Claim 6 under 35 U.S.C. § 103 as obvious over Kirenko, Lim, and McKenna.⁵

I – WRITTEN DESCRIPTION

The Examiner rejected claim 13 for lacking adequate written description. According to the Examiner, claim 13 recites the limitation “binning control module for determining,” yet “the written description does not provide a corresponding structure or algorithm to transform a general purpose computer into a specialized computer.” Final Act. 3; Ans. 11.

Appellants do not provide substantive argument related to the merits of this rejection. Reply Br. 3. Instead, Appellants contend the Examiner flip-flopped by indicating in an Advisory Action that the after-final claim amendments overcame the § 112 rejections but later indicating in the Answer that the rejection of claim 13 under § 112(a) is “not overcome.”

³ Kirenko et al., WO 2011/055288 A1, published May 12, 2011.

⁴ Lim et al., US 2010/0066849 A1, published Mar. 18, 2010.

⁵ McKenna, US 2011/0071376 A1, published Mar. 24, 2011.

Reply Br. 3 (quoting Ans. 11). Appellants also point to their earlier claim amendments and state that “Appellants are willing [to] similarly amend claim 13, which would place this claim in condition so that it should not [be] interpreted under 35 U.S.C. §112(f).” Reply Br. 3.

Although the Examiner seemingly withdrew the § 112 rejections and then later re-raised at least some of the § 112 bases for rejecting the claims (*see Adv. Act., passim; Ans. 11*), the Examiner may raise new grounds in the Answer. Inasmuch as Appellants suggest the Examiner erred by re-introducing rejections that were previously withdrawn (i.e., raising new grounds), Appellants could have petitioned to re-open prosecution. 37 C.F.R. § 41.39(b)(1). They did not, but instead filed their Reply Brief, thus maintaining the appeal. 37 C.F.R. § 41.39(b)(2). Appellants failed to substantively argue the merits of the § 112(a) rejection itself. Whether hypothetical amendments to claim 13 might overcome the rejection is a matter Appellants should take up with the Examiner if prosecution of that claim continues. On this record, however, the rejection is affirmed.

II – INDEFINITENESS

The Examiner gives two reasons for rejecting certain of the appealed claims as indefinite.

First, the Examiner rejected claim 13 as indefinite for the same reasons explained above related to the written description rejection. In short, the Examiner determined that the limitation “binning control module for determining” invokes § 112(f) (i.e., it is a means-plus-function limitation), and the Examiner finds the Specification does not recite a sufficient structure or algorithm for performing the claimed function. Final Act. 3–4; Ans. 11.

Other than the contentions raised by Appellants as discussed above in Section I (which fail here for similar reasons), Appellants do not provide any substantive argument related to the merits of the rejection of claim 13 as indefinite. Reply Br. 3. The rejection is, thus, affirmed.

Second, the Examiner finds that the phrase “substantially uniform pixel values” in claims 7, 11, 18, and 23 invokes relative terminology that renders the claims indefinite. Final Act. 3; Ans. 11. The Examiner explains that “the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.” Final Act. 3. Also, the Examiner reasons, “the written description has not provided upper and lower bounds” of the claim limitation with sufficient precision. *Id.*

Here, unlike the other rejections under § 112, Appellants do argue the merits. Appellants contend “substantially” is defined in the Specification, which states that “a substantially uniform area may particularly be referred to as an area in which the pixel values (e.g. intensity, color, and/or brightness values, etc.) are within a certain range, e.g. a percentage or absolute range, of a central value or the like.” Reply Br. 3 (citing Spec. 7:29–8:16). So, Appellants contend, the claim limitation as defined “does not require upper and lower bounds.” *Id.* at 4.

Appellants’ argument is unpersuasive. Terms of degree are neither forbidden nor necessarily indefinite, but the terms must “serv[e] reasonably to describe the claimed subject matter to those of skill in the field of the invention, and to distinguish the claimed subject matter from the prior art.” *Andrew Corp. v. Gabriel Electronics, Inc.*, 847 F.2d 819, 821 (Fed. Cir.

1988). *Seattle Box Co. Inc. v. Indus. Crating & Packaging, Inc.*, 731 F.2d 818, 826 (Fed. Cir. 1984) (“When a word of degree is used . . . [it is appropriate to consider] whether the patent’s specification provides some standard for measuring that degree.”); *In re McAward*, Appeal No. 2015-006416 (PTAB Aug. 25, 2017) (precedential) (“[T]he Office establishes a prima facie case of indefiniteness with a rejection explaining how the metes and bounds of a pending claim are not clear because the claim contains words or phrases whose meaning is unclear.”).

We are not persuaded the claims or the Specification provide the requisite clarity. The portion of the Specification to which Appellants direct our attention describes the term/phrase by using imprecise and unclear language (e.g., describing a “substantially uniform” as having pixel values “within a *certain* range.”). Spec. 8:14–15 (emphasis added). The Specification describes “[e]xamples” that “may include the standard deviation or the variance of the pixel values.” *Id.* at 8:15–16. But these are examples only, so the phrase may encompass *any range* (e.g., multiple standard deviations, covering nearly all values for a set of pixels). Indeed, Appellants contend the metes and bounds of the disputed phrase are unlimited — arguing it “does not require upper and lower bounds.” Reply Br. 4. But this begs the question: As “substantially uniform” describes and purports to limit the claimed “pixel values” of neighboring pixels, if “substantially” and “substantially uniform” are essentially boundless terms and phrases, how are they limiting?

We are not persuaded on this record that the ordinary artisan would reasonably understand the metes and bounds of the rejected claims. The rejection of claims 7, 11, 18, and 23 as indefinite is, thus, affirmed.

III – INELIGIBLE SUBJECT MATTER

In analyzing patent eligibility under 35 U.S.C. § 101, the Supreme Court has set forth a “framework for distinguishing patents that claim [patent-ineligible] laws of nature, natural phenomena, and abstract ideas from those that claim patent-eligible applications of those concepts.” *Alice Corp. Pty. Ltd. v. CLS Bank Int’l*, 134 S. Ct. 2347, 2355 (2014) (citation omitted). According to that framework, first “we determine whether the claims at issue are directed to one of those patent-ineligible concepts.” *Id.* “If so, we then ask, ‘[w]hat else is there in the claims before us?’” *Id.* (quoting *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 132 S. Ct. 1289, 1297 (2012).) To answer this second question,

we consider the elements of each claim both individually and as an ordered combination to determine whether the additional elements transform the nature of the claim into a patent-eligible application. [The Supreme Court has] described step two of this analysis as a search for an inventive concept — *i.e.*, an element or combination of elements that is sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the [ineligible concept] itself.

Id. (internal citations and quotation marks omitted).

The Examiner rejected independent claims 1, 14, and 19 as a group under § 101. Final Act. 5. As to the dependent claims, the Examiner states that “the additional recited limitations fail to establish that the claims are not directed to an abstract idea, as the additional elements/steps are also routine

and conventional without any improvements.” *Id.* at 6. We focus on the rejection of claim 1 as representative.

The Examiner states that claim 1 is drawn to an abstract idea without significantly more. *Id.* According to the Examiner finds, claim 1 is “directed to data acquisition and extracting data to classify based on saved parameters.” *Id.* at 5. The Examiner finds the “additional claim elements link the abstract idea to a particular environment [i.e., medical/diagnostic – data analysis and binning] and do not provide meaningful limitations to transform the abstract idea into a patent eligible application of the abstract idea.” *Id.* (brackets in original). Further, the Examiner reasons, claim 1 encompasses “a mental process of comparison and matching that could be performed in the human mind, or by a human using a pen and paper,” that has been computerized with generic components and functionality. *Id.* at 6. Thus, the Examiner concludes, claim 1 is patent ineligible under § 101. *Id.*

Under step one of the *Alice/Mayo* framework, we ask whether claim 1 is directed to a patent ineligible abstract idea. Because all inventions, at some level, embody or apply laws of nature, abstract ideas, etc., we must “ensure at step one that we articulate what the claims are directed to with enough specificity to ensure the step one inquiry is meaningful.” *Thales Visionix Inc. v. United States*, 850 F.3d 1343, 1347 (Fed. Cir. 2017); *see also Alice*, 134 S.Ct. at 2354 (“[W]e tread carefully in construing this exclusionary principle lest it swallow all of patent law.”). Although

applying step one of the *Alice/Mayo* framework is not always easy,⁶ we take care to avoid viewing the claims with reductionist simplicity.

We are not persuaded the Examiner met the burden to demonstrate that claim 1 is patent ineligible under § 101. As we explain further below, we disagree that claim 1 is directed merely to an abstract idea. The Federal Circuit, applying the Supreme Court’s *Alice/Mayo* framework, cautions that “describing the claims at such a high level of abstraction and untethered from the language of the claims all but ensures that the exceptions to § 101 swallow the rule.” *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1337 (Fed. Cir. 2016). That caution was not sufficiently heeded here. Indeed, the Examiner’s characterization of claim 1 is overgeneralized and does not account adequately for what the claim actually recites.

Even distilling claim 1 to its “focus” or “character as a whole,” it is more than just data acquisition and extracting data to classify as the Examiner asserts. *Id.* at 1335 (citations and internal quotations omitted). We find that claim 1 is more aptly characterized as directed to a device programmed: (i) to extract and determine (from image frames of a subject) features of a photoplethysmographic signal (i.e., PPG waveform) specific to a subject’s vital sign; and (ii) based on those signal features, to determine

⁶ The Federal Circuit acknowledged the challenge with computer-based inventions and the difficulty in distinguishing whether the invention relates to computer-functionality improvements or merely the use of computers as tools to carry out abstract ideas. *Electric Power Group, LLC v. Alstom S.A.*, 830 F.3d 1350 (Fed. Cir. 2016) (explaining that the inquiry under step one of the *Alice/Mayo* framework “may present line-drawing challenges because of the programmable nature of ordinary existing computers.”)

binning configurations (i.e., specific instructions setting how image pixels will be combined) to be applied to image frames received by the device. *See* Spec. 12:32–13:32 (defining “binning” and “binning configuration”).⁷ As Appellants note, that claim 1 may be implemented in software and potentially generic computer components (e.g., processor) does not doom the invention to abstraction. App. Br. 11. So characterized, claim 1 is sufficiently concrete and non-abstract.

In addition, even at step one, it is appropriate to consider whether claim 1 is directed to a technological improvement. *Enfish*, 822 F.3d at 1335 (holding it is “relevant to ask whether the claims are directed to an improvement to computer functionality versus being directed to an abstract idea, even at the first step of the *Alice* analysis.”). Here, as the Specification explains and Appellants persuasively argue (App. Br. 12–13; Reply Br. 4–5), the claimed invention provides a technological improvement to solve a specific problem related to extracting usable PPG signals from image frames, and taking accurate vital signs therefrom. The Specification describes, *inter alia*, known problems with remote, camera or image-based vital signs monitoring using a PPG signal. Spec. 2:12–23. According to the Specification, “[o]ne of the key challenges for this technology is to be able to provide robust measurements in low light environments or under varying environment lighting conditions ranging from full sun light to bedroom light levels at night.” Spec. 2:14–16. Due to weakness and noise in the captured image signal under such conditions, there is a high probability the signal will

⁷ “Binning refers to combining a cluster of (physical) pixels into a single (virtual) pixel.” Spec. 4:19–20.

be lost during analog-to-digital conversion. *Id.* at 2:18–23. Also, the known approaches (e.g., determining a binning configuration based on pixel brightness) risk too little or too much binning being applied, such that a meaningful PPG signal and vital sign information cannot be extracted. *Id.* at 4:29–5:2. Thus, as Appellants contend, “the present application makes use of a binning configuration based on features of a PPG signal, not only on lighting conditions which may alter the type of wavelength output from a PPG device.” Reply Br. 5; Spec. 5:3–4 (“In order to avoid these effects, the present invention proposes to determine a binning configuration based on a feature determined from an extracted PPG signal.”); *see also id.* at 5:4–9, 8:17–26, 15:10–18, and Fig. 8 (describing the use of signal features to optimize the binning configuration for the PPG signal/vital sign of interest).

Based on the considerations set forth above, we are not persuaded that claim 1 is abstract. Instead, we find claim 1 is more like the claims held to be patent eligible in cases like *Enfish*,⁸ *Thales*,⁹ *McRo*,¹⁰ and *Diehr*,¹¹ than the ineligible claims in the cases identified by the Examiner. Ans. 6. In *Digitech*, which the Examiner cites in support of the rejection, the court held

⁸ *Enfish*, 822 F.3d at 1330 (holding the claims were directed to a self-referential logical model that enabled more effective searching and storage).

⁹ *Thales*, 850 F.3d at 1345 (holding the claims were directed to use of inertial sensors in a way that reduced errors in tracking an object’s position).

¹⁰ *McRo, Inc. v. Bandai Namco Games Am. Inc.*, 837 F.3d 1299, 1314 (Fed. Cir. 2016) (holding the claims were directed to a set of computer rules allowing more accurate lip synchronization in animated characters).

¹¹ *Diamond v. Diehr*, 450 U.S. 175, 177 (1981) (holding the claims related to an improved method of molding cured rubber products, notwithstanding the claims’ reliance on an abstract mathematical formula).

that the claims were directed merely to information (a device profile made up of data sets) in non-tangible form, and thus failed to fall within any eligible statutory category under § 101. *Digitech Image Technologies, LLC v. Electronics for Imaging, Inc.*, 758 F.3d 1344, 1349 (Fed. Cir. 2014). As compared to the claim at issue in *Digitech*, claim 1 does a fair amount more in, among other things, reciting a device and processor programmed to extract and use data (i.e., features of a PPG signal/waveform) in certain ways (i.e., determining/setting binning configurations). And, as explained above, this device provides improved technological effect — the image frames binned according to the binning configurations permit more accurate signal extraction and vital-sign monitoring. The Examiner also cites *SmartGene, Inc. v. Advanced Biological Laboratories, SA.*, 555 Fed. Appx. 950 (Fed. Cir. 2014), in which the court held that claims related to the selection of a therapeutic treatment were ineligible because “every [claimed] step is a familiar part of the conscious process that doctors can and do perform in their heads.” *Id.* at 955. The claims in *SmartGene* are not analogous to claim 1, and we are not persuaded the processor programmed according to claim 1 and a doctor (or other person) seeking to determine vital signs are interchangeable.¹²

¹² The Examiner does not persuasively explain how extracting PPG signals from image frames (and determining the features from those signals), and the binning of image frames based on binning configurations could be carried out with pen and paper, or in a person’s mind. Ans. 6; App. Br. 11. On this record, key claim elements (and claim 1 generally) appears to be rooted in a technological, as opposed to merely a mental, solution.

For these reasons, we conclude the preponderance of the evidence on this record does not support the Examiner’s conclusion that claim 1 is directed to an abstract idea and patent ineligible under § 101. We reverse the rejection of claim 1 and, for similar reasons, reverse the rejection of independent claims 14 and 19, and dependent claims 2, 4–9, 11–13, 16–18, and 20–23. Moving to step two of the *Alice/Mayo* framework is not necessary and, even if we did, the result would be the same. *Thales*, 850 F.3d at 1349 (“Because we find the claims are not directed to an abstract idea, we need not proceed to step two.”); *see also Electric Power*, 830 F.3d at 1353 (explaining that “the two stages are plainly related” and that “many of [the Federal Circuit’s] opinions make clear that the two stages involve overlapping scrutiny of the content of the claims.”).

IV & V – OBVIOUSNESS

The Examiner rejected claim 1, 2, 4, 5, 7–9, 11–14, and 16–23 as obvious over Kirenko and Lim (Rejection IV), and dependent claim 6 as obvious over Kirenko, Lim, and McKenna (Rejection V). Final Act. 7–10. Because both Rejection IV and Rejection V rely on the combination of Kirenko and Lim, we address the rejections together. We focus on the rejection of claim 1 as illustrative.

The Examiner finds Kirenko teaches most of the limitations of the device of claim 1 including, *inter alia*, an interface that receives image frames from a subject and a signal extraction unit configured to extract a PPG signal from the set of image frames. Final Act. 7. The Examiner further finds that Kirenko teaches “a binning unit configured to bin image pixels . . . based on the determined binning configuration,” and subsequent

extraction of a PPG signal from binned image frames. *Id.* at 8. The Examiner finds, however, that Kirenko “fail[s] to explicitly disclose the specifics of the binning configuration or a binning unit.” *Id.* So, the Examiner turns to Lim.

According to the Examiner, Lim “disclose[s] a processing unit configured to determine a binning configuration based on a lookup table including a number of binning configurations for different values of the determined feature of the extracted signal.” *Id.* (citing Lim ¶ 23). Further, the Examiner finds, Lim teaches “the processing unit is configured to determine the binning configuration based on [] average pixel intensity and on the determined feature of the extracted signal.” *Id.* The Examiner concludes “[i]t would have been obvious . . . to modify the determination of the type of classification of Kirenko et al with determining a specific binning configuration of Lim et al as it would provide optimization of pixels being binned to optimally analyze image data.” *Id.* at 9.

Appellants raise two arguments in response. First, Appellants contend the Examiner “never particularly points out the specific portions of either Kirenko or Lim” that teach the limitation of a processor programmed to “determine a feature of said PPG signal indicative of the quality of the information content of the extracted PPG signal with respect” to the vital sign of interest. App. Br. 15. According to Appellants, “neither Kirenko nor Lim disclose anything related to extracting features indicative of a quality of a vital sign signal” of interest. *Id.* Second, Appellants argue, Kirenko and Lim do not teach a processor programmed to determine a binning configuration in the manner recited in claim 1 (i.e., based on the determined

feature of the PPG signal compared to a lookup table with configurations for different values of the determined feature). *Id.* at 15. Put differently, Appellants contend that because the cited art does not disclose extracting and determining a feature of the PPG signal as claimed, the art does not teach using the feature to determine binning configurations. According to Appellants, the Examiner relies on Lim as filling the gaps with Kirenko, yet Lim “discloses that the binning configuration is based on qualities of the pixels of the images itself, not based on features indicative of *the quality of a signal extracted from an image*, as recited in claim 1.” *Id.* at 16.

Appellants have the better position on this record. The Examiner does not make clear specifically what teachings in either Kirenko or Lim satisfy a processor that extracts and determines a feature of the PPG signal that is indicative of signal quality as recited in claim 1, much less the use of that feature for determining binning configurations. The Examiner cites to Lim’s teaching of binning based on pixel brightness, intensity, and color values, and variation between those values. Ans. 19. But we are not persuaded that teaching satisfies the limitation of claim 1 related to how the processor is programmed to determine and use a feature of the PPG signal/waveform that is indicative of the signal’s quality relative to a vital sign of interest. Indeed, the Specification and the claims indicate that the claimed PPG signal “feature” and the pixel values, such as identified by the Examiner, are different. Claim 5, for example, depends from claim 1 and requires that the processor is programmed to “determine the binning configuration based on said average pixel intensity ***and on the determined feature of the extracted***

PPG signal.” App. Br. 32 (emphasis added).¹³ Accordingly, the record is more consistent with Appellants’ argument that determining binning configurations based on qualities of the pixels themselves is different from the processor programmed as in claim 1.

The Examiner, in the Answer’s “Response to Argument,” cites a disclosure in Kirenko about attributing weights to pixels of different colors, and the Examiner states “different colors represent a different physiological characteristic used to determine the biometric characteristic (vital sign).” Ans. 19 (citing Kirenko 10:19–31). The Examiner’s position remains, however, unpersuasive. The Examiner does not explain adequately how Kirenko’s teaching of overweighting pixel values based on color, alone or combined with Lim, teaches a processor programmed to determine and use the PPG signal feature as claimed. As noted above, the Specification and claims distinguish between setting binning configurations based on a PPG signal feature indicative of the quality of the signal’s information content with respect to the desired vital sign, and setting binning configurations based pixel brightness, color, and intensity values. We acknowledge the Examiner’s assertion (Ans. 18–19) that the applicants do not specifically

¹³ See also App. Br. 33 (claim 7 (the processor is programmed to “determine the binning configuration based on said variation measure [of pixel values] **and on the determined feature of the extracted PPG signal.**”) (emphasis added)); Spec. 8:13–16 (describing the use of pixel values and variations in those values (“pixel values (e.g. intensity, color and/or brightness values etc.)”) to determine binning configurations, such as recited in claim 7); *id.* at 4:29–5:4 (explaining as advantageous the invention’s use of the PPG signal feature for setting binning configurations over known methods that establish “a binning configuration based on the brightness of the pixels.”).

define the “vital sign” or all characteristics of the signal “feature,” but the broadest reasonable interpretation of the PPG signal feature in claim 1 cannot include values and measurements that the Specification and claims, on balance, indicate are different.

For these reasons, we reverse the rejection of claim 1 as obvious over Kirenko and Lim. We also reverse the rejection of independent claims 14 and 19, which include similar limitations that we are unpersuaded are taught in Kirenko and Lim. The dependent claims are nonobvious on this record as well. *In re Fritch*, 972 F.2d 1260, 1266 (Fed. Cir. 1992) (“[D]ependent claims are nonobvious if the [] claims from which they depend are nonobvious.”) With respect to Rejection V, the Examiner has not shown that McKenna makes up for the deficiencies of Kirenko and Lim.

SUMMARY

We affirm the rejection of claim 13 as failing the written description requirement, and as indefinite. We also affirm the rejection of claims 7, 11, 18, and 23 as indefinite.

We reverse the rejections of claims 1, 2, 4–9, 11–14, and 16–23 for claiming ineligible subject matter, and for obviousness.

TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED-IN-PART